COMPUTER SYSTEM AND METHOD FOR SUGGESTING TREATMENTS FOR PHYSICAL TRAUMA

REFERENCE TO MICROFICHE APPENDIX

Reference is hereby made to a microfiche appendix submitted herewith in accordance with 37 CFR 1.96(b). The appendix contains a computer program listing in the form of two microfiche having a total of 113 frames.

FIELD OF THE INVENTION

The present invention relates to the field of expert systems, and is directed to an expert system intended for use in treating various types of trauma, and in particular, orthopedic trauma.

BACKGROUND OF THE INVENTION

Artificial Intelligence (AI) is a branch of science resulting from the marriage of the cognitive and computer sciences. Computers, originally used for the manipulation of numbers (data) are now being used for the manipulation of ideas (knowledge). Trends and solutions can be inferred by the assimilation of observed facts just as numbers are added and subtracted to produce totals. Computer systems are being developed that exhibit thought processes previously ascribed only to humans.

The study of AI leads to insight regarding the human thought processes in addition to the development of practical systems to solve problems in the workpiece, the school and the home. The "expert system" is one method of obtaining such practical results with AI.

An expert system solves a problem through the manipulation of knowledge. The system consists of an inference engine and a knowledge base. The knowledge base is compiled from the experience of human experts in the field and encoded in a computer language suited for the description of ideas and principles. The inference engine controls the flow of the program, tracing solutions.

The inference engine has, in recent years, become a widely available product through a number of companies, including Gold Hill Computers Inc., of Cambridge, Massachusetts; Intellicorp, of Mountain View, California; Technology Applications, Inc., of Jacksonville, Florida; Teknowledge Inc., of Palo Alto, California; Neuron Data Inc., of Palo Alto, California; and Texas Instruments, of Austin, Texas. Two inference engines have been disclosed in U.S. Pat. Nos. 4,658,370 to Erman et al., and 4,648,044 to Hardy et al., both assigned to Teknowledge Inc.

Expert systems recently have found use in a variety of applications, such as in agriculture, chemistry, computer design, construction, engineering, finance, management, health care, manufacturing, and others. For example, in U.S. Pat. No. 4,591,983 Bennett et al., an expert system for use in inventory control is disclosed, and U.S. Pat. Nos. 4,517,468, 4,642,782, and 4,644,479, all to Kemper et al., each disclose a diagnostic system for monitoring an industrial system, such as a steam turbine generator power plant.

In the health care field, hospitals and medical laboratories have used computers to analyze blood and run certain tests. Data bases have been established for recommending drug therapies for certain types of cancers. An expert system made by Cardinal Systems Inc., Minneapolis, Minnesota, includes standard textbooks data, and a

graphical illustration of the sympathetic nervous system, for purposes of testing a diagnosis, and recommending therapeutic drugs. Other expert diagnostic and treatment systems are specific to a particular healthcare concern, such as, for example, a system called "Senex", specifically designed to aid in the treatment of breast cancer, and a system called "Hepatitis Assistant", designed for better diagnosis and treatment of hepatitis patients. Other health care systems are known to address the specific fields of epilepsy, poison control, childbirth and physical rehabilitation.

Although prior art expert systems have been designed to address a relatively wide range of health care concerns, little is known to have been done in the area of treatment of physical trauma. That is, it is beleived that none of the existing expert systems designed for health care applications have provided the ability to perform a consultation to help determine the optimal manner in which to treat a specific type of trauma. Such a system would be useful not only for suggesting a treatment, but also for providing a consultation session between an experienced surgeon and a learning surgeon.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an expert system directed to the treatment of physical trauma.

It is a further object of the present invention to provide an expert system for the specific field of orthopedic trauma.

It is a further object of the present invention to provide an expert system which provides one or more treatment recommendations based upon specific classifications of physical trauma.

It is a further object of the present invention to provide an expert system capable of providing a treatment recommendation based upon specific classes of orthopedic trauma.

These objects are achieved by placing textbook information, such as fracture classifications, in a database, and expert information concerning orthopedic fractures in a knowledge base. In use, a fracture to to be treated is classified, and additional trauma information is obtained, along with some patient history. Initial treatment suggestions based upon the classification of the fracture are judged for appropriateness based upon supplemental clinical information, namely the expert information in the knowledge base. During inferencing, addititional information may be requested by the computer as needed. Treatment suggestions are presented in the order of preferred use.

The expert system in accordance with the present invention provides the user with one or more suggested treatments for a patient with physical trauma. The system includes a computing device having a memory, a plurality of databases in the memory, an application program and an inference engine program. The databases include graphic illustrations of different types of physical trauma and a knowledge base which contains treatment information. The application program is executed in the computing device and interactively displays a series of screens, including at least some of the graphical illustrations, to elicit reponses from the user concerning the specific type of physical trauma and specific characteristics of the patient. The inference